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BACKGROUND CONTAMINATION BY COPLANAR POLYCHLORINATED BIPHENYLS (PCBs) IN TRACE LEVEL HIGH RESOLUTION GAS CHROMATOGRAPHY/HIGH RESOLUTION MASS SPECTROMETRY (HRGC/HRMS) ANALYTICAL PROCEDURES

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Abstract

The addition of the "dioxin-like" polychlorinated biphenyl (PCB) congeners to the assessment of risk associated with the 2,3,7,8-chlorine substituted dioxins and furans has dramatically increased the number of laboratories worldwide that are developing analytical procedures for their detection and quantitation. Most of these procedures are based on established sample preparation and analytical techniques employing high resolution gas chromatography/ high resolution mass spectrometry (HRGC/HRMS), which are used for the analyses of dioxin/furans at low parts-per-trillion (ppt) levels. A significant and widespread problem that arises when using these sample preparation procedures for the analysis of coplanar PCBs is the presence of background levels of these congeners. Industrial processes, urban incineration, leaking electrical transformers, hazardous waste accidents, and improper waste disposal practices have released appreciable quantities of PCBs into the environment. This contamination has resulted in the global distribution of these compounds via the atmosphere and their ubiquitous presence in ambient air. The background presence of these compounds in method blanks must be addressed when determining the exact concentrations of these and other congeners in environmental samples.

In this study reliable procedures were developed to accurately define these background levels and assess their variability over the course of the study. The background subtraction procedures developed and employed increase the probability that the values reported accurately represent the concentrations found in the samples and were not biased due to this background contamination.